

## **WHAT IS CLAIMED IS:**

1. A method for producing fullerenes, comprising:
  - a first process of either imperfectly combusting or thermally decomposing a hydrocarbon fuel in a reactor, thereby producing a high-temperature gas flow containing fullerenes and soot;
  - a second process of collecting a mixture of the fullerenes and the soot from the gas flow containing the fullerenes and the soot using a filtering unit, said filtering unit including a heat-resistant filtering member made of either one of a porous ceramic material and a porous metal material as a raw material; and
  - a third process of collecting the fullerenes from the mixture.
2. A method for producing fullerenes as defined in claim 1, wherein the high-temperature gas flow generated by said first process is regulated in temperature by a temperature-regulating unit to a range of more than 300 to 600 °C.
3. A method for producing fullerenes as defined in claim 1, wherein said collecting the fullerenes according to said third process comprises dissolving the mixture into a solvent to collect and separate the fullerenes from the mixture.
4. A method for producing fullerenes as defined in claim 1, wherein said collecting the fullerenes according to said third process comprises heating the mixture to an elevated temperature in the absence of oxygen to vaporize the fullerenes, thereby separating the fullerenes from the soot.
5. A method for producing fullerenes as defined in claim 1, wherein said heat-resistant filtering member has a filtration flow capability to filter the gas flow that streams through said heat-resistant filtering member, the filtration flow capability being in a range of 0.2 to 10 m<sup>3</sup> /m<sup>2</sup>/minute.
6. A method for producing fullerenes as defined in claim 1, wherein said reactor has an exhaust port provided at a lower portion of said reactor, the high-temperature gas flow containing the fullerenes and the soot being discharged out of

said reactor through said exhaust port.

7. A method for producing fullerenes as defined in claim 6, wherein said reactor has a burner provided at an upper portion of said reactor for either imperfectly combusting or thermally decomposing the hydrocarbon fuel.

8. A method for producing fullerenes as defined in claim 1, wherein said filtering unit includes a plurality of cylindrical-shaped unit filter elements, each of which is made of said heat-resistant filtering member, and each of which has a bottom, said plurality of cylindrical-shaped unit filter elements being divided into plural gangs; and

wherein the gas flow is streamed through each of said unit filter elements from outside of each of said unit filter elements to inside of each of said unit filter elements.

9. A method for producing fullerenes as defined in claim 8, wherein, when said unit filter elements get clogged up, an inert gas is fed through said unit filter elements from inside to outside of each of said unit filter elements, thereby removing the mixture from said unit filter elements.

10. A method for producing fullerenes as defined in claim 9, wherein said removing the mixture from said unit filter elements using the inert gas comprises removing the mixture from said unit filter elements for each of the plural gangs.